CLAIM AMENDMENTS

1. (original) A method for forming a solder joint in an electronic assembly having one or more copper connection sites, the method comprising the steps of:

applying a thin nickel layer to at least one copper connection site;

applying a diffusion layer to the thin nickel layer;

positioning lead-free solder adjacent to the diffusion layer;

reflowing the solder thereby forming a solder joint at the copper connection site.

2. (original) A method according to claim 1 wherein the thin nickel layer is applied to a thickness of greater than about 0.05 microns.

3. (original) A method according to claim 1 wherein the thin nickel layer is applied to a thickness of less than about 0.05 microns.

4. (original) A method according to claim 1 wherein the thin nickel layer is applied to a thickness of less than about 0.28 microns.

5. (original) A method according to claim 1 wherein the thin nickel layer is applied to a thickness within the range of approximately 0.05 microns to approximately 0.28 microns.

6. (original) A method according to claim 1 wherein the diffusion layer is applied to a thickness of greater than about 0.1 microns.

7. (original) A method according to claim 1 wherein the diffusion layer is applied to a thickness of less than about 0.3 microns.

8. (original) A method according to claim 1 wherein the diffusion layer is applied to a thickness within the range of approximately 0.1 microns to approximately 0.3 microns.

9. (original) A method according to claim 1 wherein the diffusion layer comprises palladium.

10. (original) A method according to claim 1 wherein the diffusion layer comprises gold.

11. (original) A method according to claim 1 wherein the step of reflowing the solder further comprises the formation of a copper-tin intermetallic compound bond between the copper connection site and the solder.

12. (original) A method according to claim 1 wherein the step of reflowing the solder further comprises the formation of a copper-nickel-tin intermetallic compound bond between the copper connection site and the solder.

13. (original) A solder joint for a semiconductor apparatus assembly, wherein the assembly has at least one copper connection site, the solder joint comprising:

a thin nickel layer on at least one copper connection site;

a diffusion layer on the thin nickel layer; and

lead-free solder joined to the copper connection site.

14. (original) A solder joint according to claim 13 wherein the solder joint further comprises a copper-tin intermetallic compound.

15. (original) A solder joint according to claim 13 wherein the solder joint further comprises a copper-tin-nickel intermetallic compound.

16. (original) A solder joint according to claim 13 wherein the thin nickel layer comprises nickel having a thickness of greater than about 0.05 microns.

17. (original) A solder joint according to claim 13 wherein the thin nickel layer comprises nickel having a thickness of less than about 0.28 microns.

18. (original) A solder joint according to claim 13 wherein the thin nickel layer comprises nickel having a thickness within a range of between approximately 0.05 microns and approximately 0.28 microns.

19. (original) A solder joint according to claim 13 wherein the diffusion has a thickness of greater than about 0.1 microns.

20. (original) A solder joint according to claim 13 wherein the diffusion layer has a thickness of less than about 0.3 microns.

21. (original) A solder joint according to claim 13 wherein the diffusion layer has a thickness within a range of between approximately 0.1 microns and approximately 0.3 microns.

22. (original) A solder joint according to claim 13 wherein the diffusion layer comprises palladium.

23. (original) A method according to claim 13 wherein the diffusion layer comprises gold.

24. (original) A solder joint for a semiconductor apparatus assembly, wherein the assembly has at least one copper connection site, the solder joint comprising:

a thin intermetallic compound layer comprising copper-tin bonded to the copper connection site;

a thin nickel layer bonded to the thin intermetallic compound layer;

lead-free solder encapsulating the thin nickel layer and the intermetallic compound layer forming a solder joint.

25. (original) A solder joint according to claim 24 wherein the thin intermetallic compound layer further comprises copper-nickel-tin.

26. (original) A solder joint according to claim 24 wherein the lead-free solder encapsulating the thin nickel layer further comprises diffused gold.

27. (original) A solder joint according to claim 24 wherein the lead-free solder encapsulating the thin nickel layer further comprises diffused palladium.

28. (original) A solder joint according to claim 24 wherein the thin nickel layer comprises nickel having a thickness sufficient to retard the formation of copper-tin intermetallic compound over time.

29. (original) A solder joint according to claim 24 wherein the thin nickel layer comprises nickel having a thickness of less than about 0.28 microns.

30. (original) A solder joint according to claim 24 wherein the thin nickel layer comprises nickel having a thickness of greater than about 0.05 microns.

31. (original) A solder joint according to claim 24 wherein the thin nickel layer comprises nickel having a thickness within a range of between approximately 0.05 microns and approximately 0.28 microns.

32. (original) A solder joint according to claim 24 wherein the intermetallic compound layer further comprises undulations.

33. (original) A solder joint for a semiconductor apparatus assembly, wherein the assembly has at least one copper connection site, the solder joint comprising:

a thin undulating intermetallic compound layer comprising copper-nickel-tin bonded to the copper connection site;

a thin nickel layer bonded to the thin intermetallic compound layer; and

solder encapsulating the thin nickel layer and the thin undulating intermetallic compound layer forming a solder joint, the solder joint further comprising a relatively small quantity of diffused palladium.

34. (new) A method for forming a multilayer solder attachment site in an electronic assembly having one or more copper connection sites, the method comprising the steps of:

applying a thin nickel layer to at least one copper connection site;

applying a diffusion layer to the thin nickel layer;

thereby forming a multilayer solder attachment site for facilitating the formation of an intermetallic compound upon the application of molten solder.

35. (new) A method according to claim 34 wherein the intermetallic compound comprises copper-tin.

36. (new) A method according to claim 34 wherein the intermetallic compound comprises copper-tin-nickel.

37. (new) A method according to claim 34 wherein the diffusion layer comprises palladium.

38. (new) A method according to claim 34 wherein the diffusion layer comprises gold.

39. (new) A method according to claim 34 wherein the thin nickel layer is applied to a thickness of greater than about 0.05 microns.

40. (new) A method according to claim 34 wherein the thin nickel layer is applied to a thickness of less than about 0.28 microns.

41. (new) A method according to claim 34 wherein the thin nickel layer is applied to a thickness within the range of approximately 0.05 microns to approximately 0.28 microns.

42. (new) A method according to claim 34 wherein the diffusion layer is applied to a thickness of greater than about 0.1 microns.

43. (new) A method according to claim 34 wherein the diffusion layer is applied to a thickness of less than about 0.3 microns.

44. (new) A method according to claim 34 wherein the diffusion layer is applied to a thickness within the range of approximately 0.1 microns to approximately 0.3 microns.

45. (new) A method according to claim 34 further comprising steps of interposing an intermediate nickel layer atop the copper connection site and an intermediate copper layer thereon underlying the thin nickel layer.

46. (new) A multilayer solder attachment site in an electronic assembly having one or more copper connection sites, the multilayer solder attachment site comprising:

a thin nickel layer on at least one copper connection site;

a diffusion layer on the thin nickel layer;

wherein a multilayer solder attachment site is provided for facilitating the formation of an intermetallic compound upon the application of molten solder.

47. (new) A multilayer solder attachment site according to claim 46 wherein the multilayer solder attachment site is adapted for the formation of an intermetallic compound comprising copper-tin.

48. (new) A multilayer solder attachment site according to claim 46 wherein the multilayer solder attachment site is adapted for the formation of an intermetallic compound comprising copper-tin-nickel.

49. (new) A multilayer solder attachment site according to claim 46 wherein the diffusion layer comprises palladium.

50. (new) A multilayer solder attachment site according to claim 46 wherein the diffusion layer comprises gold.

51. (new) A multilayer solder attachment site according to claim 46 wherein the thin nickel layer is greater than about 0.05 microns in thickness.

52. (new) A multilayer solder attachment site according to claim 46 wherein the thin nickel layer is less than about 0.28 microns in thickness.

53. (new) A multilayer solder attachment site according to claim 46 wherein the thin nickel layer is within the range of approximately 0.05 microns to approximately 0.28 microns in thickness.

54. (new) A multilayer solder attachment site according to claim 46 wherein the diffusion layer is greater than about 0.1 microns in thickness.

55. (new) A multilayer solder attachment site according to claim 46 wherein the diffusion layer is less than about 0.3 microns in thickness.

56. (new) A multilayer solder attachment site according to claim 46 wherein the diffusion layer is within the range of approximately 0.1 microns to approximately 0.3 microns in thickness.

57. (new) A multilayer solder attachment site according to claim 46 further comprising an intermediate nickel layer atop the copper connection site and an intermediate copper layer thereon underlying the thin nickel layer.

58. (new) A multilayer solder attachment site according to claim 57 wherein the intermediate nickel layer is approximately 0.5 microns in thickness.

59. (new) A multilayer solder attachment site according to claim 57 wherein the intermediate copper layer is greater than about 0.5 microns in thickness.

60. (new) A multilayer solder attachment site according to claim 57 wherein the intermediate copper layer is less than about 1.0 microns in thickness.